LOANING RADIATION SURVEY EQUIPMENT TO CITIZENS' GROUPS

Purpose

This Air Quality Group procedure describes the process for responding to requests by private citizens' groups to borrow radiation survey instruments.

Scope

This procedure applies to group members who are responsible for loaning the dedicated radiation survey instruments to citizens groups, as provided by the Consent Decree.

In this procedure

This procedure addresses the following major topics:

Hazard Control Plan

The hazard evaluation associated with this work is documented in HCP-ESH-17-Office Work.

Signatures

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Approved by: Terry Morgan, QA Officer	Date: 12/7/99
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01/19/00

CONTROLLED DOCUMENT

This copy is uncontrolled if no signatures are present or if the copy number stamp is black. Users are responsible for ensuring they work to the latest approved revision.

General information about this procedure

Attachments

This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Instructions for Using Radiation Survey Equipment	2
2	Example of Letter and Receipt For Loaned Instruments	2

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	6/9/98	New document.
1	12/7/99	Changes made to process and approval documentation.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- Consent Decree Project Leader
- group members who loan instruments to citizens' groups

Not required to train to this procedure are:

- members of citizens' groups who use the instruments

Training method

The training method for this procedure is **self-study** ("reading") and is documented in accordance with the procedure for training (ESH-17-024).

References

The following documents are referenced in this procedure:

- ESH-17-024, "Personnel Training"
- ESH-1-07-85.1, "Operational Checks of Beta/Gamma Survey Instruments"
- ESH-1-07-86.1, "Operational Checks of Alpha Survey Instruments"
- ESH-1-07-89.0, "Operational Checks of Alpha/Beta Dual Use Probes"

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Checking out loaner radiation survey instrumentation

Receiving requests

A member of a citizens' group may request loaner instrumentation by calling ESH-17. The **Consent Decree Project Leader** receives the requests and ensures the steps below are performed.

Training users

Members of citizen's groups that request instruments must be trained in their use and the fundamentals of radioactivity, as provided in the Consent Decree. Ensure any organization requesting the instruments has received the training by checking with the group training coordinator. Exceptions to this rule may be granted by the Division Office, the group office, or the Consent Decree Project Leader.

Steps to loan instruments

To loan out radiation survey instruments, perform the following steps:

Step	Action
1	Ensure instruments are available and have current calibrations.
2	Obtain extra batteries, cables, and probes for the instruments.
3	Perform an instrument function check on the equipment before releasing. If possible, follow the appropriate ESH-1 procedure (ESH-1-07-85.1, ESH-1-07-86.1, or ESH-1-07-89.0; see references and ESH-1 home page).
4	Include a copy of Attachments 1 and 2 with the instruments being loaned.
5	Prepare a letter and receipt for the instrument(s) being loaned, similar to the example in Attachment 3. Include the model and serial number of the instrument(s). Obtain the signature of the borrower on the receipt, if possible.

NOTE: No property removal form is necessary for these particular instruments. Special arrangements have been established with the ESH Division property control representative.

Retrieving instruments for recalibration

The E-600 will not operate past the calibration date entered in memory. The instrument must be retrieved and recalibrated so the user can continue to use it. Keep a log or otherwise track the recalibration dates and retrieve the instrument before the recalibration due date.

Checking out loaner radiation survey instrumentation, continued

Check on unreturned equipment

If the equipment has not been returned within a week after the estimated return date, call the borrower and inquire about when the equipment might be returned. If the borrower wishes an extension, make appropriate records to document the new return date.

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be submitted **within 2 weeks** as records to the records coordinator:

- copy of the letter and receipt for the borrowed instruments

INSTRUCTIONS FOR USING RADIATION SURVEY EQUIPMENT

Set the *Response* switch to *Slow*, *Med*, or *Fast.* The slower the response is set, the less "bounce" the readout will have, but it will take longer for the reader to respond to fluctuations in the radiation being measured.

Select Ratemeter, Integrate, or Scaler mode to perform measurements.

- Ratemeter mode is generally used to sweep large areas
- Scaler determines the count rate (cpm) and is usually used where areas have been divided into grids and a single reading is taken within each grid. The instrument determines count rate by counting the number of detection events and dividing that value by the time.
- Integrate mode will count the detection events between pressing start and stop (using the asterik button). Total count time is manually controlled.

Determine background. Background should always be established using the same medium to be surveyed. Example: A parking lot is to be surveyed. Background should be established on a parking lot that is not suspected of being contaminated. If both ratemeter and scaler modes are to be used to conduct the survey, determine background in each of these modes.

Determine value that is statistically different from background by calculating a trigger level. The trigger level is the 95% upper confidence level of the background. This value is the mean background + two standard deviations of the background. The standard deviation of the background is $s_b = \sqrt{\frac{R_b}{t_b}}$ where s_b is the standard deviation of the background, R_b is the background count rate and t_b is the background count time. (See Oak Ridge Associated Universities Training Manual, Statistics Section). Note that this equation cannot be used for dose rate or dpm readings. For those readings, the standard deviation of background should be determined using multiple background counts.

Press the Spkr key to turn the speaker on and off.

Survey the area. A suggested method is to sweep the area of interest at a rate of approximately 5 cm/sec. When surveying for alpha, the probe should be within ½ cm of the surface being surveyed. When surveying for beta, the probe should be within 1 cm of the surface. The instrument should be operated in ratemeter mode. If an area is found that exceeds the trigger level, the probe can be held stationary over that area. If high readings persist, try a stationary 1 minute count in scaler mode. **NOTE**: Use extreme caution when using the alpha probe because if it touches the area being surveyed, the mylar covering of the probe will tear and the instrument will have to be repaired before continuing measurements.

At any time during the survey, values may be stored ("logged") in the E-600. Log the values by pressing the Log key once (this stores a sequential survey point number) and then a second time (this stores the survey value). A map of the area should be drawn prior to the survey so that the sequential survey point number can later be hand-mapped to a location.

Probes to use with E-600 instrument

Probe	Radiation detected	Potential source	Comment
SHP-270	beta/ gamma	Cs-137, Co-60, Sr-90, Uranium	Window open for beta emitters, but over-responds to gamma energies <200keV with window open. Exposure rate, approximate background of 15 to 20 μR/hr.
SPA-3	gamma	Cs-137, Co-60, Uranium	Suggested for large area surveys, cpm or exposure rate measurements, approximate background of 7-10 k cpm, 10 to 25 μR/hr
SHP-330	alpha/ beta	Sr-90, Uranium, Tc-99	cpm measurements, approximate background of 0 to 1 cpm alpha and 20 to 25 cpm beta.
SHP-380AB	alpha/ beta	Sr-90, Uranium	cpm measurements, approximate background of 0 to 1 cpm alpha and 125 to 150 cpm beta.
SHP-280 (3" Neutron rem Detector)	neutron	Direct penetrating radiation source, e.g., accelerator, critical assembly, or reactor	Typically used in conjunction with a 9" neutron sphere (use ratio of 9"/3"). Helps in determination of the energy spectrum of the neutron flux. Does not respond to thermal neutrons because of cadmium covering. Responds between 2 keV-1 MeV with corresponding count rate per mrem/h of 1800 to 15. This means this detector over-responds to lower energy neutrons and under-responds to higher ones.

cpm = counts per minute MeV = million electron volts, a measure of particle energy
keV = thousand electron volts, a measure of particle energy

To switch probes: TURN OFF INSTRUMENT! Squeeze the cable connections to remove them from the E-600 and the probes. DO NOT yank on the cables – this can damage or loosen the connections.

Loose cables can cause the count rates to jump very quickly. Should this occur, double check cable connections or try another cable -- TURN OFF INSTRUMENT to change cables.

For alpha particles, the detector in the SHP-380AB is ZnS. If the mylar film is punctured, the light leak will cause the alpha response to elevate to very high levels instantaneously. Temporary field repairs can be performed by the LANL field rep; the mylar film can be replaced by LANL ESH-4 personnel.

Background values are given in the table above simply to give a "ballpark" idea of a realistic background. This is an indication that the instrument is functioning properly. Approximate backgrounds are outside in air in the White Rock area. Backgrounds are different in media other than air and in other locations, and can vary with time. Background values used for a survey should be established as described on other side of this page.

EXAMPLE OF LETTER AND RECEIPT FOR LOANED INSTRUMENTS

Los Alamos National Laboratory

ESH-17, Air Quality Group
P.O. Box 1663, Mail Stop J978
Los Alamos, New Mexico 87545 Date: Wednesday, January 19, 2000
(505) 665-8855 / FAX: (505) 665-8858 Refer to: ESH-17:98-177

Mr. Jay Shelton
Santa Fe Preparatory School
1101 Camino Cruz Blanca
Santa Fe, NM 87501

Dear Jay:

Attached is the Receipt of Equipment for the Eberline E-600 kit. Thank you for your interest in this piece of equipment. If you have any questions, please feel free to contact me at 667-1849 or the Group Office at 665-8855.

Sincerely,

Allen Treadaway

Receipt of Equipment:

As part of the consent Decree between DOE and CCNS, a radiation detection equipment repository has been established. The Eberline E-600 kit (with the following detectors) is being borrowed by _____ of _____. The address is _____ and the phone number is (505)-_____. The borrower has been provided with training in the use and care of this equipment. The anticipated return date is _____.

_____ _____

Borrower's Signature LANL Representative's Signature

_____ _____

Date Date

E-600 ID#:	Last Calibration Date:	Calibration Due Date:	Condition/Comment:
Detector(s)			
SHP-270 (GM-Beta/Gamma)			
SHP-330 (GM-Pancake)			
SHP-380AB (Alpha/Beta-Scint.)			
SSPA-3 (NaI-Gamma-μR)			
SHP-280 3" NRD (Neutron)			

Misc. Equipment			
Detector Cable			
Data Cable (as needed)			
Spare Batteries			
Manual			
Check Source (as needed)			